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INSECTICIDE USE ON COTTON IN 1979

by

Robert McDowell
Cleveland Marsh
Craig Osteen

May 1982

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**Natural Resource Economics Division
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INSECTICIDE USE ON COTTON IN 1979. By Robert McDowell, Cleveland Marsh, and Craig Osteen; Natural Resource Economics Division, Economic Research Service, U.S. Department of Agriculture, Washington, D.C. 20250; May 1982.

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ABSTRACT

In 1979, farmers reported they applied 22 million pounds (active ingredient) of insecticides in 30 million acre-treatments on 6.5 million acres of cotton. This consisted of 9.2 million pounds (a.i.) in 19.8 million acre-treatments of single material applications and 12.8 million pounds (a.i.) in 10.2 million acre-treatments of tank mixes. In 1979, an average of 4.6 insecticide applications were made per treated acre with 3.4 pounds of active ingredient being applied. Of the 30 million acre-treatments, 4.6 million were in the Southeast, 10.6 million in the Delta, 8.4 million in the Southern Plains, and 6.3 million in the Far West. The primary insecticides used were methyl parathion, chlordimeform, permethrin, EPN, and fenvalerate. The percentage of planted acres treated, the number of times insecticides were applied, and the total amount of insecticides applied to cotton in 1979 showed a decline from previous years.

Key words: Cotton, pesticide use, acres treated, acre-treatments, insecticides, miticides, single material applications, tank-mix applications, application rates, United States, Southeast, Delta, Southern Plains, Far West.

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INSECTICIDE USE ON COTTON IN 1979

INTRODUCTION

This report presents data and analyses of insecticide use on cotton in the United States in 1979. Data were generated from a survey of over 2,000 cotton growers in 12 States on pesticide use and pest management practices used in cotton production. Data include acres treated, average number of treatments per acre, quantity applied per acre-treatment, quantity per acre treated, and total acre-treatments for specific insecticides. This report presents regional and national data. State data are included in the Appendices.

These insecticide data should be of interest to agronomists, entomologists, economists, environmentalists, the agricultural chemical industry, and agricultural policymakers. These data can be used for examining pesticide regulation policy, evaluating the potential impacts of large-area pest management programs, and determining overall insecticide use patterns. Insecticide use on cotton is of particular interest because historically it has accounted for over half of the total quantity of insecticides used in U.S. agriculture (3).

In 1979, U.S. cotton farmers planted 14 million acres of cotton and harvested 14.6 million bales (480 pounds per bale) of cotton lint from 12.8 million acres (Table 1). Cotton lint yields averaged 550 pounds per acre, ranging from 976 pounds in the Far West to 393 pounds in the Southern Plains. The average yield in Arizona (1,046 pounds per acre) was 2.7 times greater than the average yield in Texas (389 pounds per acre). This difference was primarily due to irrigation.

The Southern Plains produced about 40 percent of the U.S. cotton crop, the Far West about 33 percent, the Delta about 20 percent, and the Southeast, 4 percent. Texas produced nearly 38 percent of the entire U.S. crop; New Mexico produced less than 1 percent. The total value of U.S. cotton production

Table 1. U.S. cotton acreage, production, yield, and value, 1979 a/

Region and State	: Area planted : b/	: Area harvested : b/	: Lint yield per acre : b/	: Production : b/	: Value : c/
	-----1000 acres-----		Lbs.	1,000 bales d/	Million dollars
<u>Southeast</u>					
Alabama	310	305	510	324	102
Georgia	155	150	486	152	48
South Carolina	110	109	510	116	37
Total	575	564	504	592	187
<u>Delta</u>					
Arkansas	610	530	549	606	190
Louisiana	470	465	712	690	212
Mississippi	1,090	1,050	657	1,437	438
Tennessee	250	230	357	171	52
Total	2,420	2,275	613	2,904	892
<u>Southern Plains</u>					
Oklahoma	600	580	432	522	150
Texas	7,731	6,831	389	5,539	1,486
Total	8,331	7,411	393	6,061	1,636
<u>Far West</u>					
Arizona	624	618	1,046	1,347	451
California	1,650	1,635	1,000	3,408	1,186
New Mexico	170	141	380	112	38
Total	2,444	2,394	976	4,867	1,675
TOTAL, STATES SURVEYED	13,770	12,644	548	14,424	4,390
U.S. TOTAL e/	13,978	12,831	547	14,629	4,450

- a/ The States listed are those included in the "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division. The data include Upland and American-Pima cotton.
- b/ "Crop Production-1980 Annual Summary," USDA, ESS, Crop Reporting Board, CrPr 2-1(81), January 14, 1981.
- c/ "Crop Values-1978-1979-1980," USDA, ESS, Crop Reporting Board, CrPr 2-1(81), January 22, 1981. Value is for lint cotton only.
- d/ Standard bale equals 480 pounds net weight.
- e/ U.S. totals include data for Florida, Missouri, Nevada, North Carolina, and Virginia.

in 1979 exceeded \$5 billion: \$4.4 billion for cotton lint and \$700 million for cottonseed (5).

SURVEY METHODS

Insecticide data were collected by the Survey Division, Economics and Statistics Service, U.S. Department of Agriculture using an area-frame sampling method. Sample fields were randomly selected from growers sampled in the June Enumerative Survey who responded that they planned to plant, or had planted, cotton in 1979. Because each acre had the same probability of being selected, the probability of a given field being selected was directly proportional to the field size.

The data were gathered from personal interviews with cotton farmers. Data were collected on insecticides used, application rates, frequency of use, acres treated with specific materials, pest management practices, and general agronomic practices.

Of the 2,460 growers contacted, 2,027 completed questionnaires. The number of completed questionnaires, by State, was as follows: Alabama, 104; Arizona, 88; Arkansas, 198; California, 232; Georgia, 67; Louisiana, 107; Mississippi, 334; New Mexico, 57; Oklahoma, 85; South Carolina, 75; Tennessee, 95; and Texas, 585. These States accounted for about 99 percent of acres planted and harvested, total production, and value of U.S. cotton production in 1979 (Table 1).

The data gathered in the survey were expanded at the State level and aggregated to regional and U.S. totals. The expansion factors were computed by dividing the planted acres in the State by the number of completed questionnaires.

Terminology

Several important terms used in this report are defined as follows:

Acres treated: the number of acres treated one or more times with a specific insecticide during the growing season.

Times applied: the number of times a specific insecticide was applied to a treated acre during the growing season.

Acre-treatments: the number of acres treated with an insecticide material multiplied by the number of applications made during the growing season.

Active ingredient (a.i.): the portion of the insecticide product that provides the control activity.

Single application: insecticide materials applied alone (not mixed with any other insecticide).

Tank-mix application: two or more insecticides mixed in the spray tank prior to application. Insecticide materials mixed during formulation are included in this category.

Aggregating or comparing these data must be done with caution. For example, "acres treated" refers to the acres treated with a specific insecticide, however, a given acre may have been treated with more than one insecticide during the growing season. Thus, summing acres treated with different insecticide materials may result in double counting. The quantities of pesticides applied and application rates are the sum of all applications, including broadcast, band, and spot treatments.

RELIABILITY OF ESTIMATES

Estimates based on sample surveys have varying degrees of statistical reliability. Confidence in data depends on sample size, sampling methods, and the variability of the responses. To provide users of the data with some

indication of the reliability of the estimates, coefficients of variation (CV's) were calculated. The CV is a measure of relative variation (expressed in percentage terms) and can be used to indicate the degree of confidence a user can place in the estimate. The smaller the CV, the more reliable the estimate.

In simplest terms, it can be said there is 95 percent confidence that the sample represents the true population and that the true value for the population lies within an interval defined as \pm 2 CV's times the estimated value. For example, with a CV of 10 percent and an estimate of 40, the interval would be 32 to 48. However, there is also a 5 percent chance the true value does not fall within the interval as defined above because the sample is not representative of the population.

CV's were calculated only for acres treated with specific insecticides. The estimates of acres treated are expected to have greater variation than other data reported. Consequently, for most other information included in this report, the level of reliability should be equal to or greater than reported for acres treated.

LONG TERM INSECTICIDE USE TREND

From the standpoint of total quantity applied, insecticide use on cotton has declined during the past decade. Nationwide pesticide surveys on cotton indicate that 22 million pounds (a.i.) were applied in 1979 compared to 64 million pounds in 1976 and 73 million pounds in 1971 (3). The use of insecticides varies depending on the extent and intensity of insect populations. The percent of planted acres treated with insecticides and the average number of applications per season were estimated for 1972 and 1974 based on data from cost of production surveys (1). In 1979, 48 percent of the cotton acreage was treated with insecticides compared to 60 percent in 1972 and 1974. Also, the

average number of applications per treated acre in 1979 (4.6) was lower than in 1972 (6.1) and 1974 (6.5).

There were several reasons for these trends. The 1979 crop year was considered by many entomologists and cotton insect control specialists to have been characterized by one of the lowest insect infestation levels, hence the lowest insecticide use experienced in many years (6). This would account for the lower percent of planted acres treated with insecticides and the lower number of applications per treated acres.

While this partially explains the reduction in the total quantity of insecticides used, another factor that contributed to the reduction was a change in materials used. In 1971, the primary cotton insecticides were the organochlorines, DDT and toxaphene, and the organophosphate insecticide methyl parathion (3). These materials are applied at rates of 0.5 - 4.0 pounds (a.i.) per acre-treatment. By 1976, DDT had been canceled for all agricultural uses but toxaphene and methyl parathion were still the primary cotton insecticides (3).

Since 1976, a major change in cotton insecticide use has occurred with the rapid adoption and widespread use of two synthetic pyrethroids, fenvaleate and permethrin. These two materials, not used in cotton in 1976, were among the five most commonly used insecticides in 1979 (Table 4). Fenvaleate and permethrin are used at very low rates. The average quantity applied per acre-treatment in 1979 for fenvaleate was 0.10 pound (a.i.), for permethrin, 0.12 pound (a.i.).

The shift to insecticides that have lower application rates, the relatively low percent of planted acres treated with insecticide in 1979, and the relatively low number of treatments per acre all contributed to the low total quantity (pounds a.i.) of insecticides applied to cotton in 1979.

INSECTICIDE USE IN 1979

Insecticide use on cotton in 1979 totaled about 30 million acre-treatments applied to about 6.5 million acres (Table 2). Farmers used 22 million pounds (a.i.) of insecticides, applying them an average of 4.6 times per treated acre. Single applications totaled about 20 million acre-treatments (Table 3) and tank-mix applications, 10 million (Table 4). At the U.S. level, as well as at regional and State levels, the majority of pesticide applications involved relatively few materials. The 11 most commonly used single application materials accounted for 16.7 million acre-treatments, 84 percent of single application acre-treatments and 56 percent of all acre-treatments. Seven tank mixes accounted for 7.1 million acre-treatments, 70 percent of tank-mix acre-treatments and 24 percent of all acre-treatments.

Comparison between regions

Planted acres in the States surveyed totaled 13.8 million acres, consisting of 8.3 million acres (60 percent) in the Southern Plains, 2.4 million acres in both the Delta and the Far West, and 575,000 acres (4 percent) in the Southeast (Table 2). Texas accounted for 56 percent of the planted acres and South Carolina for less than 1 percent.

About 6.5 million acres were treated with insecticides, 48 percent of planted acres. Insecticide use was least extensive in the Southern Plains where only 25 percent of planted acres were treated, compared to 94 percent in the Southeast and 80 percent in the Delta and Far West regions. Insecticide use was most extensive in Georgia and South Carolina where 100 percent of the planted acres were treated, and least extensive in Oklahoma where 19 percent of planted acres were treated with insecticides.

The intensity of insecticide use also varied by region. On the average,

Table 2. Insecticide use on cotton in the United States, by State and region, 1979 a/

Region and State	: Acres planted	: Acres treated	: Acre- treatments: d/	: Quantity applied (a.i.) : Per acre : Total	: Average : times : Treated:Treatment		
	: b/ : c/			1,000 1,000 lbs.	1,000 Lbs.	No.	
Southeast							
Alabama	310	273	1,742	987	3.62	0.57	6.4
Georgia	155	155	2,097	1,439	9.28	.70	13.5
South Carolina	110	110	793	237	2.15	.30	7.2
Total	575	538	4,632	2,663	4.95	.56	8.6
Delta							
Arkansas	610	378	1,022	551	1.46	.54	2.7
Louisiana	470	460	3,437	2,560	5.57	.74	7.5
Mississippi	1,090	1,026	6,112	2,809	2.74	.46	6.0
Tennessee	250	66	66	21	.33	.33	1.0
Total	2,420	1,930	10,637	5,941	3.08	.54	5.5
Southern Plains							
Oklahoma	600	113	481	94	.83	.19	4.3
Texas	7,731	1,979	7,879	4,054	2.05	.51	4.0
Total	8,331	2,092	8,360	4,148	1.98	.50	4.0
Far West							
Arizona	624	529	2,952	1,859	3.51	.63	5.6
California	1,650	1,391	3,294	7,270	5.23	2.21	2.4
New Mexico	170	69	86	73	1.06	.86	1.2
Total	2,444	1,989	6,332	9,202	4.63	1.45	3.2
TOTAL, STATES SURVEYED <u>e/</u>	13,770	6,549	29,961	21,954	3.35	.73	4.6

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ From Table 1, column 1.

c/ Acres treated one or more times with any insecticide.

d/ Acres treated (column 2) multiplied by average times applied (column 7).

e/ Does not include data for Florida, Missouri, Nevada, North Carolina, and Virginia.

Table 3. Insecticides applied as single materials on cotton in the United States, 1979 a/

Insecticide	: Acres : treated : b/	: Acre- : treatments: : c/	: Quantity applied (a.i.) : Per acre : Total : Treated	: Average : times : Treatment	: applied
	-----1,000-----		1,000 lbs.	Lbs.	No.
			d/		
Acephate	393 (12)	624	357	.91	.57
Aldicarb	867 (10)	867	480	.55	.55
Azinphosmethyl	428 (11)	994	276	.64	.28
Chlordimeform	693 (8)	1,874	379	.55	.20
Dicrotophos	1,126 (7)	2,117	250	.22	.12
Dicofol	559 (9)	566	439	.79	.78
Dimethoate	760 (8)	1,223	224	.29	.18
Fenvalerate	884 (6)	3,475	359	.41	.10
Methomyl	285 (12)	550	183	.64	.33
Methyl parathion	357 (14)	1,058	544	1.52	.51
Permethrin	1,127 (7)	3,361	401	.36	.12
Other	-	3,112	5,323	-	1.71
TOTAL	-	19,821	9,215	-	.46

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" are not reported because two or more materials may have been used on the same acre, resulting in multiple counting. Therefore, quantity applied per treated acre and average times applied are not estimated.

c/ Acres treated (column 1) multiplied by average times applied (column 6).

d/ Coefficients of variation for acres treated (in percent) are in parentheses. The coefficient is the standard error of the estimate multiplied by 100 and divided by the estimate. The coefficient is a measure of reliability; the lower the coefficient, the more reliable the estimate.

Table 4. Insecticides applied as tank mixes on cotton in the United States, 1979 a/

Insecticide mix	: Acres treated b/	: Acre-treatments c/	: Quantity applied (a.i.) Per acre Total	: Average times Treated:Treatment	: Average applied Lbs.	No.
	-----1,000-----		1,000 lbs.	-----Lbs.-----		
	<u>d/</u>					
Chlordimeform	253 (19)	1,095	157	.62	.14	4.3
+ EPN			687	2.72	.63	
+ methyl parathion			687	2.72	.63	
Chlordimeform	156 (21)	223	34	.22	.15	1.4
+ methomyl			69	.44	.31	
Chlordimeform	310 (15)	1,230	165	.53	.13	4.0
+ permethrin			137	.44	.11	
EPN	919 (6)	3,456	1,837	2.00	.53	3.8
+ methyl parathion			2,293	2.50	.66	
Fenvalerate	88 (22)	245	24	.27	.10	2.8
+ methyl parathion			115	1.31	.47	
Methomyl	23 (29)	278	141	6.07	.51	12.1
+ permethrin			57	2.45	.20	
Methyl parathion	209 (14)	597	516	2.47	.86	2.9
+ toxaphene			1,037	4.96	1.74	
Chlordimeform	-	450	101	-	.22	-
+ methyl parathion			215	-	.48	
+ insecticides			358	-	.80	
Chlordimeform	-	698	99	-	.14	-
+ insecticides			413	-	.59	
Methyl parathion	-	852	319	-	.37	-
+ insecticides			445	-	.52	
Other insecticides	-	1,016	2,833	-	2.79	-
TOTAL	-	10,140	12,739	-	1.26	-

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" are not reported because two or more materials may have been used on the same acre, resulting in multiple counting. Therefore, quantity applied per treated acre and average times applied are not estimated.

c/ Acres treated (column 1) multiplied by average times applied (column 6).

d/ Coefficients of variation for acres treated (in percent) are in parentheses. The coefficient is the standard error of the estimate multiplied by 100 and divided by the estimate. The coefficient is a measure of reliability; the lower the coefficient, the more reliable the estimate.

4.6 insecticide applications were made per treated acre in the States surveyed. The average number of applications per treated acre was 8.6 in the Southeast, 5.5 in the Delta, 4.0 in the Southern Plains, and 3.2 in the Far West. The highest average was reported in Georgia -- 13.5 applications per treated acre, while Texas had the lowest -- one application per treated acre per season.

A different measure of use intensity is the ratio of insecticide use (acre-treatments) to cotton production (bales). Dividing total acre-treatments (Table 2, column 3) by the total number of bales produced (Table 1, column 5) in each region yields the following acre-treatments per bale ratios: Southeast, 7.8; Delta, 3.7; Southern Plains, 1.4; and Far West, 1.3. Thus, in the Southeast an average of 7.8 insecticide acre-treatments were made for each bale of cotton harvested, 6 times greater than the 1.3 insecticide acre-treatments per bale harvested in the Far West.

At the U.S. level, treated acres received an average of 3.4 pounds (a.i.) of insecticides in 1979. The average quantity applied (pounds a.i.) per acre was 5.0 in the Southeast, 4.6 in the Far West, 3.1 in the Delta, and 2.0 in the Southern Plains. The average rate per treated acre in Georgia was 9.3 pounds (a.i.) compared to 0.3 pounds (a.i.) in Tennessee.

Single material applications

The materials most commonly used as single applications were applied to substantial portions of the acres treated with insecticides. Dicrotophos and permethrin were applied to about 1.1 million acres each, 17 percent of treated acres (Table 3). Fenvalerate and aldicarb were each applied to about 900,000 acres, 13 percent of treated acres. Dimethoate, the fifth most commonly used material with respect to acres treated, was applied to about 750,000 acres, 12 percent of treated acres.

Fenvalerate, the most commonly used single material application with

respect to acre-treatments, was applied in 3.5 million acre-treatments, 18 percent of single material acre-treatments. Permethrin was applied in 3.4 million acre-treatments (17 percent of single material acre-treatments), diclofophos in 2.1 million acre-treatments (11 percent), chlordimeform in 1.9 million acre-treatments (9 percent), and dimethoate in 1.2 million acre-treatments (6 percent). Over 30 insecticides were reported used as single material applications; these five accounted for 61 percent of single material acre-treatments.

Tank-mix applications

Over 90 different tank mixes were reported in the survey. As with the single applications, a few tank mixes accounted for most of the tank-mix applications (Table 4).

Compared to the single applications, the most commonly used tank mixes were applied to a smaller percentage of treated acres. EPN plus methyl parathion was applied to about 920,000 acres (14 percent of treated acres), about 3 times as many acres as the next highest tank-mix, chlordimeform plus permethrin, which was applied to 310,000 acres.

EPN plus methyl parathion was the most commonly used tank mix with respect to acre-treatments. About 3.5 million acre-treatments of EPN plus methyl parathion were applied, representing 34 percent of tank mixes and 12 percent of all acre-treatments. The second most commonly applied tank mix, chlordimeform plus permethrin, accounted for 1.2 million acre-treatments, which was 12 percent of the tank mixes and 4 percent of all acre-treatments. The third most commonly used tank mix was chlordimeform plus EPN plus methyl parathion, applied to about 250,000 acres in about 1.1 million acre-treatments.

Single application and tank-mix use of major insecticides

Summing the acre-treatments of specific insecticides in both single material applications and tank mixes shows the predominance of 10 insecticides (Table 5). Methyl parathion, the predominant insecticide used on cotton, was included in about 8 million acre-treatments (27 percent of all acre-treatments). Chlordimeform, with 5.7 million acre-treatments (19 percent of all acre-treatments), was the second most commonly applied material. Permethrin ranked third and EPN ranked fourth, each representing about 17 percent of all acre-treatments. Fenvalerate, the fifth most often used material, accounted for 3.8 million acre-treatments, about half that of methyl parathion. Dicrotophos ranked sixth with 2.3 million acre-treatments, 8 percent of the U.S. total.

THE SOUTHEAST REGION

The States included in the 1979 Cotton Pesticide Use Survey in the Southeast region were Alabama, Georgia, and South Carolina. Insects, diseases, and other factors contributed to the decline of cotton production in the Southeast region, which once was the major cotton producing region in the United States.

Most of the cotton grown in the Southeast relies on rainfall for moisture. Skip-row planting of cotton is common in this region. In 1978, insect control costs ranged from \$62 to \$67 per acre (4). The major insect pests in the Southeast include the boll weevil, bollworm-budworm, thrips, and armyworms (2).

Cotton growers in the Southeast applied 4.6 million acre-treatments of insecticides, 3.1 million as single materials and 1.5 million as tank mixes (Table 6). About one-third of the total quantity of insecticides was applied in single material applications and two-thirds was applied in tank mixes.

The three most commonly used insecticides as single material applications

Table 5. The 10 major insecticides used on cotton in the United States,
1979 a/

Insecticide	Acre-treatments		
	Single material		Tank-mix
	applications b/	applications c/	Total
<u>1,000</u>			
Chlordimeform	1,874	3,696	5,570
Dimethoate	1,223	38	1,261
Dicrotophos	2,117	164	2,281
EPN	29	4,870	4,899
Fenvalerate	3,475	306	3,781
Methomyl	550	799	1,349
Methyl parathion	1,058	6,973	8,031
Parathion	175	585	760
Permethrin	3,361	1,808	5,169
Toxaphene	38	958	996

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ From Table 3, column 2.

c/ From Table 4, column 2. The acre-treatments for each tank mix are reported under the specific insecticides used in that tank mix. For example, the acre-treatments for EPN + methyl parathion (3,456,000) are reported under both EPN and methyl parathion in this table. Therefore, the data in this column and in the "total" column cannot be summed because it may result in multiple counting.

Table 6. Insecticide use on cotton in the Southeast region, 1979 a/

Insecticide	: Acres : treated : b/	: Acre- treatments : c/	: Quantity applied (a.i.) : Per acre : Total : Treated : Treatment	: Average : times : applied
	-----1,000-----		1,000 lbs.	-----Lbs.----- No.
<u>Single applications</u>				
Aldicarb	160	160	81	.51 .51 1.0
Azinphosmethyl	58	137	47	.81 .34 2.4
Chlordimeform	80	185	29	.36 .16 2.3
Diflubenzuron	37	185	11	.30 .06 5.0
Fenvalerate	201	761	72	.36 .09 3.8
Methyl parathion	102	376	208	2.04 .55 3.7
Permethrin	224	866	109	.49 .13 3.9
Other	-	414	208	- .50 -
Total	-	3,084	765	- .25 -
<u>Tank mixes</u>				
Azinphosmethyl + other	-	173	47	.27 -
			25	- .14
Chlordimeform + methyl parathion	25	102	79	3.09 .77 4.1
			22	.85 .21
Fenvalerate + methyl parathion	19	118	13	.70 .11 6.2
			64	3.47 .54
Methyl parathion + EPN	101	429	262	2.59 .61 4.2
			261	2.58 .61
Methyl parathion + toxaphene	83	302	279	3.36 .92 3.6
			555	6.69 1.84
Methyl parathion + other	-	254	136	- .54 -
			112	- .44
Other	-	170	43	- .25 -
Total	-	1,548	1,898	- -
TOTAL INSECTICIDES	538	<u>d/</u> 4,632	2,663	4.95 .56 8.6

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division. Coefficients of variation for acres treated and the data for the States included in the Southeast region (Alabama, Georgia, and South Carolina) are presented in Appendix A.

b/ Data in this column for "other" and "total" are not reported because two or more materials may have been used on the same acre, resulting in multiple counting. Therefore, quantity applied per treated acre and average times applied are not estimated.

c/ Acres treated (column 1) multiplied by average times applied (column 6).

d/ From Table 2, column 2.

were fenvaleate, permethrin, and aldicarb. Fenvaleate was applied to 201,000 acres (37 percent of the treated acres) an average of 3.8 times per season, totaling 761,000 acre-treatments, or 25 percent of the single application acre-treatments. Permethrin was applied to 224,000 acres (42 percent of treated acres) an average of 3.9 times per season, totaling 866,000 acre-treatments, 28 percent of single application acre-treatments. Aldicarb was applied once per season to about 30 percent (160,000) of treated acres. Other materials applied as single material applications were methyl parathion, chlordimeform, and diflubenzuron. Methyl parathion accounted for 12 percent, chlordimeform for 6 percent, and diflubenzuron for 6 percent of single material application acre-treatments.

The predominant tank mixes used in the Southeast were methyl parathion plus EPN, methyl parathion plus toxaphene, and fenvaleate plus methyl parathion. The most commonly applied tank mix, methyl parathion plus EPN, was applied to about 100,000 acres, 19 percent of the acres treated for insect control. About 429,000 acre-treatments (28 percent of the tank-mix acre-treatments) of methyl parathion plus EPN were applied.

Methyl parathion plus toxaphene use totaled 302,000 acre-treatments (20 percent of tank-mix acre-treatments) on about 80,000 acres (15 percent of treated acres). Fenvaleate plus methyl parathion was applied to only 4 percent (19,000 acres) of treated acres, but it was applied more times per season (average of 6.2) than any other single material or tank mix, and accounted for 8 percent of the tank-mix acre-treatments. Azinphosmethyl plus other insecticides accounted for 11 percent of tank-mix acre-treatments and methyl parathion plus other insecticides accounted for 16 percent of tank-mix acre-treatments.

State insecticide use data for Alabama, Georgia, and South Carolina are presented in Appendix A. Synthetic pyrethroids were the most commonly used

single material applications in the region: fenvalerate in Alabama and South Carolina and permethrin in Georgia. Methyl parathion plus EPN and methyl parathion plus toxaphene were the most commonly used tank mixes in each State.

DELTA REGION

The Delta region includes Arkansas, Louisiana, Mississippi, and Tennessee. There is only a small amount of irrigated cotton in the Delta and skip-row planting is common. The major insect pests are the boll weevil, bollworm-budworm, thrips, and plant bugs (2). In 1978, insect control costs ranged from \$20 to \$50 per acre (4).

Cotton farmers in the Delta applied 10.6 million acre-treatments of insecticides, 5.7 million in single material applications and 3.9 million in tank-mix applications (Table 7). About 1.6 million pounds (a.i.) of insecticides were applied in single material applications and 4.4 million pounds (a.i.) were applied in tank-mix applications.

Although farmers reported using 25 insecticides, a few materials accounted for most of the insecticide use in the Delta. Fenvalerate, chlordimeform, and permethrin were the major insecticides used in single material applications. Fenvalerate was applied to 460,000 acres (24 percent of treated acres), dimethoate to 360,000 acres (19 percent), and permethrin to 290,000 acres (15 percent). Fenvalerate use totaled 1.6 million acre-treatments (24 percent of single material acre-treatments), permethrin 1.3 million (20 percent), and chlordimeform 908,000 (13 percent). Dimethoate was applied in 527,000 acre-treatments, 8 percent of single material acre-treatments. The use of fenvalerate, dimethoate, chlordimeform, permethrin, and methyl parathion accounted for 74 percent of all single material acre-treatments and 47 percent of all acre-treatments.

Tank mixes accounted for about 37 percent of all acre-treatments. The

Table 7. Insecticide use on cotton in the Delta region, 1979 a/

Insecticide	: Acres : treated : b/	: Acre- treatments: c/	: Quantity applied (a.i.) Per acre Total	: Average times Treated:Treatment	: Average applied
			1,000 1,000	1,000 lbs.	Lbs.
					No.
<u>Single applications</u>					
Azinphosmethyl	85	291	52	.61	.18
Chlordimeform	272	908	186	.68	.20
Dicrotophos	256	414	75	.29	.18
Dimethoate	361	527	64	.18	.12
EPN	13	75	93	7.15	1.24
Fenvalerate	459	1,644	163	.36	.10
Methomyl	160	333	118	.74	.35
Methyl parathion	206	598	273	1.33	.46
Permethrin	289	1,320	165	.57	.13
Other	-	633	402	-	.64
Total	-	6,743	1,591	-	.24
<u>Tank mixes</u>					
Chlordimeform	88	175	20	.23	.11
+ methomyl			50	.57	.29
Chlordimeform	69	440	91	1.32	.21
+ EPN			244	3.54	.55
+ methyl parathion			244	3.54	.55
Chlordimeform	-	161	52	-	.32
+ methyl parathion			77	-	.48
+ other			130	-	.81
Methyl parathion	683	2,557	1,493	2.19	.58
+ EPN			1,411	2.07	.55
Methyl parathion	38	129	32	.84	.25
+ permethrin			14	.36	.10
Methyl parathion	54	104	83	1.54	.80
+ toxaphene			227	4.20	2.19
Methyl parathion	-	250	87	-	.30
+ other			74	-	.32
Other	-	78	21	-	.28
Total	-	3,894	4,350	-	1.05
TOTAL INSECTICIDES	1,930	d/ 10,637	5,941	3.08	.54
					5.5

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division. Coefficients of variation for acres treated and the data for the States included in the Delta region (Arkansas, Louisiana, Mississippi, and Tennessee) are presented in Appendix B.

b/ Data in this column for "other" and "total" are not reported because two or more materials may have been used on the same acre, resulting in multiple counting. Therefore, quantity applied per treated acre and average times applied are not estimated.

c/ Acres treated (column 1) multiplied by average times applied (column 6).

d/ From Table 2, column 2.

most common tank mix, EPN plus methyl parathion, accounted for 66 percent of the tank-mix acre-treatments and was applied to about one-third of all treated acres. Chlordimeform plus EPN plus methyl parathion was applied in 440,000 acre-treatments (9 percent of all tank-mix acre-treatments) to about 70,000 acres. Tank mixes that included methyl parathion totaled 3.6 million acre-treatments, 94 percent of the total tank-mix acre-treatments.

State insecticide use data for Arkansas, Louisiana, Mississippi, and Tennessee are presented in Appendix B. The most commonly used single material applications varied by State: chlordimeform in Arkansas, permethrin in Louisiana, fenvalerate in Mississippi, and disulfoton in Tennessee. Chlordimeform plus methomyl was the most commonly used tank mix in Arkansas and EPN plus methyl parathion was the most commonly used tank mix in Louisiana and Mississippi.

SOUTHERN PLAINS REGION

The Southern Plains region includes Texas and Oklahoma. About half the cotton acreage in the Southern Plains is irrigated. Skip-row planting is common in dryland cotton-producing areas. In 1978, insect control costs ranged from \$0.50 to \$2.60 per acre on dryland cotton and \$3.00 to \$30.00 per acre on irrigated cotton (5). The key cotton pests in the Southern Plains include the cotton fleahopper, boll weevil, bollworm-budworm, thrips, and plant bugs (2).

Cotton growers in the Southern Plains reported using 16 insecticides in single material applications totaling 5.4 million acre-treatments and 7 tank mixes in 3 million acre-treatments (Table 8). About one-third of the total quantity of insecticides applied was in single material applications and two-thirds in tank mixes.

The most widely used single material in the Southern Plains, dicrotophos, was applied to 826,000 acres, 39 percent of all treated acres. Single material

Table 8. Insecticide use on cotton in the Southern Plains region, 1979 a/

Insecticide	: Acres : treated : b/	: Acre- treatments: c/	: Quantity applied (a.i.) : Per acre : Total 1,000	: Average times Treated:Treatment Lbs. 1,000 lbs.	: Average applied No.
<u>Single applications</u>					
Acephate	78	122	77	.98	.63
Aldicarb	210	210	107	.51	.51
Azinphosmethyl	225	356	115	.51	.32
<u>Bacillus</u>					
<u>thuringiensis d/</u>	84	175	-	-	2.1
Chlordimeform	224	352	72	.32	.20
Dicrotophos	826	1,650	165	.20	.10
Dimethoate	308	577	132	.43	.23
Disulfoton	120	120	121	1.01	1.01
Fenvalerate	74	655	72	.98	.11
Parathion	122	137	107	.87	.78
Permethrin	383	746	66	.17	.09
Sulprofos	113	113	120	1.06	1.06
Trichlorfon	99	142	46	.46	.32
Other	-	39	17	-	.40
Total	-	5,394	1,217	-	.23
<u>Tank mixes</u>					
<u>Bacillus</u>					
<u>thuringiensis d/</u>	-	91	-	-	-
+ other			29	-	.32
Chlordimeform	114	607	65	.76	.11
+ permethrin			57	.50	.09
Chlordimeform	-	419	50	-	.12
+ other			246	-	.59
Methyl parathion	132	456	346	2.62	.76
+ EPN			346	2.62	.76
Methyl parathion	165	655	419	2.54	.64
+ EPN			419	2.54	.64
+ chlordimeform			60	.36	.09
Methyl parathion	-	510	285	-	.56
+ other			465	-	.91
Toxaphene	-	228	143	-	.63
+ other			96	-	.43
Total	-	2,966	2,931	-	.99
TOTAL INSECTICIDES	2,092 e/	8,360	4,148	1.98	.50
					4.0

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division. Coefficients of variation for acres treated and the data for the States included in the Southern Plains region (Texas and Oklahoma) are presented in Appendix C.

b/ Data in this column for "other" and "total" are not reported because two or more materials may have been used on the same acre, resulting in multiple counting. Therefore, quantity applied per treated acre and average times applied are not estimated.

c/ Acres treated (column 1) multiplied by average times applied (column 6).

d/ Quantity data not reported because Bacillus thuringiensis is expressed in terms of number of spores per gram rather than in pounds of active ingredients.

e/ From Table 2, column 2.

applications of dicrotophos totaled about 1.6 million acre-treatments, 31 percent of single material acre-treatments and about 20 percent of all acre-treatments. Two other materials commonly used in single material applications were permethrin and dimethoate; permethrin was applied to about 380,000 acres (18 percent of all treated acres) and dimethoate was applied to about 310,000 acres (15 percent of all treated acres). Bacillus thuringiensis, a microbial insecticide not widely used in other regions, accounted for about 270,000 acre-treatments, 3 percent of all acre-treatments.

The most commonly used tank mixes in the Southern Plains were applied to a smaller percentage of treated acres than in other regions and also constituted a smaller percentage of acre-treatments. The most commonly used tank mix, methyl parathion plus chlordimeform plus EPN, was used to treat 165,000 acres (8 percent of treated acres) an average of about 4 times per season for a total of 655,000 acre-treatments, 22 percent of tank-mix acre-treatments and 8 percent of all acre-treatments. The second most commonly used tank mix, chlordimeform plus permethrin, was applied to 114,000 acres an average of about 7 times a season for a total of 607,000 acre-treatments, 7 percent of all acre-treatments. Tank mixes that included methyl parathion accounted for about 1.6 million acre-treatments, as did tank mixes that included chlordimeform.

State level insecticide use data for Oklahoma and Texas are presented in Appendix C. In Oklahoma, the material most commonly used alone was permethrin; the most commonly used tank mix was chlordimeform plus permethrin. In Texas, the material most commonly used alone was dicrotophos; the most commonly used tank mix was methyl parathion plus EPN plus chlordimeform.

FAR WEST REGION

The Far West region includes Arizona, California, and New Mexico. Essentially all of the cotton in this region is irrigated. The major insect and mite pests in the Far West region include boll weevil, pink bollworm, bollworm-budworm, plant bugs, thrips, cotton leaf perforator, and spider mites (2). Insect problems vary considerably by State; in 1978, insect and mite control costs in the Far West ranged from \$35 per acre in California to \$110 per acre in Arizona (4).

Cotton growers in the Far West region used 28 different pesticides in single material applications and 11 different tank mixes (Table 9). Growers made 4.6 million single material acre-treatments and 1.7 million tank-mix acre-treatments. Two-thirds of the total quantity applied (5.6 million pounds, a.i.) was in single material applications and one-third (3.6 million pounds, a.i.) was in tank mixes. The opposite occurred in the other regions.

In contrast to the other regions, miticides were among the most commonly used materials in the Far West. Dicofol and propargite, both miticides, were applied to 28 and 20 percent of the acres treated in the region. They were applied one time during the growing season.

Many different insecticides were used by growers, but chlordimeform and permethrin were the most important in terms of acre-treatments. The most commonly applied tank mix in the Far West region was chlordimeform plus permethrin with 623,000 acre-treatments, 36 percent of the tank-mix acre-treatments. Chlordimeform was also combined with several other insecticides in tank mixes.

Growers in the Far West applied 9.2 million pounds (a.i.) of insecticides and miticides. Sulfur accounted for a high proportion of the total with 2.8 million pounds applied as single ingredient acre-treatments and 1.5 million pounds in tank-mix acre-treatments. Sulfur was applied at high rates (over 30

Table 9. Insecticide and miticide use on cotton in the Far West region, 1979 a/

Insecticide/miticide	: Acres treated b/	: Acre- treatments c/	: Quantity applied (a.i.) Per acre Total	: Average times Treated:Treatment	: Average applied
	-----1,000-----		1,000 lbs.	-----Lbs.-----	No.
<u>Single applications</u>					
Acephate	223	343	.191	.86	.56
Aldicarb	321	343	.232	.72	.68
Azinphosmethyl	62	210	.60	.97	.29
Chlordimeform	117	428	.94	.80	.22
Dicofol	559	566	.438	.78	.77
Dimethoate	55	62	.15	.27	.24
Disulfoton	112	112	.96	.86	.86
Fenvalerate	151	415	.51	.34	.12
Methamidophos	133	141	.98	.74	.70
Methidathion	92	164	.75	.82	.46
Methomyl	79	86	.34	.47	.40
Methyl parathion	39	64	.51	1.31	.80
Monocrotophos	158	278	.181	1.15	.65
Permethrin	231	429	.61	.26	.14
Phorate	179	179	.113	.63	.63
Propargite	383	402	.576	1.51	1.44
Sulfur	85	174	2,837	33.38	16.30
Other	126	204	.439	3.49	2.15
Total	-	4,600	5,642	-	1.23
<u>Tank mixes</u>					
Chlordimeform	21	69	.12	.56	.17
+ fenvalerate			.9	.44	.13
Chlordimeform	41	55	.13	.31	.23
+ methyl parathion			.40	.96	.72
Chlordimeform	21	62	.9	.44	.15
+ methyl parathion			.13	.84	.28
+ parathion			.35	1.68	.56
Chlordimeform	29	85	.21	.71	.25
+ monocrotophos			.80	2.71	.94
Chlordimeform	196	623	.100	.51	.16
+ permethrin			.81	.41	.13
Chlordimeform	-	183	.33	-	.18
+ other			.178	-	.97
Methamidophos	13	158	.75	5.70	.47
+ fenvalerate			.19	1.44	.12

-- continued

Table 9. Insecticide and miticide use on cotton in the Far West region, 1979 a/
-- continued

Insecticide/miticide	: Acres : treated Insecticide/miticide	: Acre- treatments: b/	: Quantity applied (a.i.) Per acre c/	: Average times Total : Treated:Treatment applied	
		-----1,000-----	1,000 lbs.	-----Lbs.-----	No.
<u>Tank mixes (cont'd)</u>					
Methyl parathion + other	-	139 108	62 -	.45 .78	-
Parathion + sulfur	52	98 1,500	70 28.85	.71 15.31	1.9
Propargite + other	-	83 55	79 -	.95 .61	-
Other	-	177	968	-	5.47
Total	-	1,732	3,560	-	2.06
TOTAL INSECTICIDES/ MITICIDES	1,989 <u>d/</u>	6,332	9,202	4.63	1.45
					3.2

- a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division. Coefficients of variation for acres treated and the data for the States included in the Far West (Arizona, California, and New Mexico) are presented in Appendix D.
- b/ Data in this column for "other" and "total" are not reported because two or more materials may have been used on the same acre, resulting in multiple counting. Therefore, quantity applied per treated acre and average times applied are not estimated.
- c/ Acres treated (column 1) multiplied by average times applied (column 6).
- d/ From Table 2, column 2.

pounds per acre) to about 140,000 acres, less than 7 percent of the acres treated in the region. California accounted for 99 percent of the sulfur used in the Far West region.

State level insecticide use data for Arizona, California, and New Mexico are presented in Appendix D. The most commonly used single material application in Arizona was chlordimeform; the most commonly used tank mix was chlordimeform plus permethrin. The material most commonly used alone in California was dicofol (a miticide); the most commonly used tank mix was fenvalerate plus methidathion. Aldicarb was the material most commonly used alone in New Mexico; no tank mixes were reported used in New Mexico.

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APPENDIX A

1979 Insecticide Use on Cotton in the Southeast region

Table A-1. Coefficients of variation

Table A-2. Alabama

Table A-3. Georgia

Table A-4. South Carolina

Table A-1. Coefficients of variation for acres of cotton treated with single material and tank-mix applications of insecticides, by State, Southeast region, 1979 ^{a/}

Insecticide	: South :			
	: Alabama :	Georgia	: Carolina :	Southeast
<u>Percent</u>				
<u>Single applications</u>				
Aldicarb	29	14	24	12
Azinphosmethyl	40	24	44	19
Chlordimeform	26	39	21	16
Dicrotophos	29	-	-	b/
Diflubenzuron	-	22	-	14
Dimethoate	34	-	30	b/
Disulfoton	-	-	57	b/
Fenvalerate	12	36	10	9
Methomyl	29	70	-	b/
Methyl parathion	40	49	-	49
Monocrotophos	32	-	-	b/
Permethrin	14	12	19	8
Phorate	-	28	-	b/
Sulprofos	-	-	70	b/
Toxaphene	49	-	-	b/
<u>Tank mixes</u>				
Chlordimeform + <u>Bacillus thuringiensis</u>	-	-	49	49
Chlordimeform + methyl parathion	-	28	-	28
EPN + methyl parathion	27	23	-	15
Fenvalerate + methyl parathion	-	33	-	33
Methomyl + methyl parathion + permethrin	-	29	-	29
Methomyl + permethrin	-	29	-	29
Methyl parathion + toxaphene	70	19	-	15

- None reported.

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resources Economics Division.

b/ Use of this material at the regional level was not significant and was reported in the "other" category.

Table A-2. Insecticide use on cotton in Alabama, 1979 a/

Insecticide	: Acres : treated : b/	: Acre- treatments: c/	: Quantity applied (a.i.) : Per acre : Total	: Average : times : Treated:Treatment	
		1,000	1,000 lbs.	Lbs.	No.
<u>Single applications</u>					
Aldicarb	56	56	26	.47	.47
Azinphosmethyl	19	19	7	.36	.36
Chlordimeform	41	94	12	.29	.13
Dicrotophos	34	34	7	.20	.20
Dimethoate	25	25	6	.24	.24
Fenvalerate	121	440	49	.40	.11
Methomyl	34	109	25	.74	.23
Methyl parathion	58	151	68	1.17	.45
Monocrotophos	28	116	89	3.18	.77
Permethrin	112	275	37	.33	.13
Toxaphene	12	37	51	4.35	1.35
Total	-	1,356	377	-	.28
<u>Tank mixes</u>					
Methyl parathion + EPN	47	257	139 139	2.96 2.96	.54 .54
Methyl parathion + toxaphene	19	97	95 197	5.00 10.36	.98 2.03
Methyl parathion + other d/	-	32	12 28	-	.39 .87
Total	-	386	610	-	1.58
TOTAL INSECTICIDES	273 e/	1,742	987	3.62	.57
					6.4

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" are not reported because two or more materials may have been used on the same acre, resulting in multiple counting. Therefore, quantity applied per treated acre and average times applied are not estimated.

c/ Acres treated (column 1) multiplied by average times applied (column 6).

d/ Includes chlordimeform + toxaphene, methomyl + toxaphene, and permethrin.

e/ From Table 2, column 2.

Table A-3. Insecticide use on cotton in Georgia, 1979 a/

Insecticide	: Acres : treated : b/	: Acre- treatments: c/	: Quantity applied (a.i.) : Per acre : Total Treated:Treatment	: Average times applied		
			1,000 1,000	1,000 Lbs.	1,000 Lbs.	No.
<u>Single applications</u>						
Aldicarb	67	67	34	.51	.51	1.0
Azinphosmethyl	32	88	33	1.01	.37	2.8
Chlordimeform	14	28	4	.30	.15	2.0
Diflubenzuron	37	185	11	.39	.06	5.0
Fenvalerate	16	93	8	.51	.09	5.8
Methomyl	5	9	3	.61	.30	1.8
Methyl parathion	44	225	140	3.17	.62	5.0
Permethrin	81	409	47	.58	.12	5.0
Phorate	25	25	19	.75	.75	1.0
Total	-	1,129	296	-	.26	-
<u>Tank mixes</u>						
Azinphosmethyl + other d/	-	173	47	-	.27	-
			25	-	.14	
Methyl parathion + chlordimeform	25	102	79	3.09	.77	4.1
			22	.85	.21	
Methyl parathion + methomyl	23	111	58	2.50	.52	4.8
			16	.60	.14	
			13	.58	.12	
Methyl parathion + EPN	35	150	112	3.23	.74	4.3
			111	3.19	.74	
Methyl parathion + fenvalerate	19	118	64	3.47	.54	6.2
			13	.70	.11	
Methyl parathion + toxaphene	46	160	157	3.41	.98	3.5
			320	6.96	2.00	
Methyl parathion + other e/	-	69	48	-	.70	-
			38	-	.55	
Permethrin + methomyl	23	85	9	.37	.10	3.7
			11	.48	.13	
Total	-	968	1,143	-	1.09	-
TOTAL INSECTICIDES	155 f/	2,097	1,439	9.28	.70	13.5

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" are not reported because two or more materials may have been used on the same acre, resulting in multiple counting. Therefore, quantity applied per treated acre and average times applied are not estimated.

c/ Acres treated (column 1) multiplied by average times applied (column 6).

d/ Includes fenvalerate, fenvalerate + methomyl, and permethrin.

e/ Includes EPN + methomyl, fenvalerate + methomyl, methomyl, and permethrin.

f/ From Table 2, column 2.

Table A-4. Insecticide use on cotton in South Carolina, 1979 a/

Insecticide	: Acres : treated : b/	: Acre- treatments: c/	: Quantity applied (a.i.) : Per acre : Total	: Average : times : Treated:Treatment	
	1,000		1,000 lbs.	Lbs.	No.
<u>Single applications</u>					
Aldicarb	37	37	21	.57	.57
Azinphosmethyl	7	30	7	.99	.25
Chlordimeform	25	79	13	.50	.16
Dimethoate	15	35	5	.33	.14
Disulfoton	5	5	3	.60	.60
Fenvalerate	64	228	15	.24	.07
Permethrin	31	182	25	.78	.14
Sulprofos	3	3	3	.97	.97
Total	-	599	92	-	.15
<u>Tank mixes</u>					
Fenvalerate + other <u>d/</u>	-	73	5	-	.07
			26	-	.36
Methyl parathion + other <u>e/</u>	-	109	46	-	.42
			66	-	.61
<u>Bacillus</u> <u>thuringiensis f/</u> + chlordimeform					
	6	12	-	-	-
			2	.33	.17
Total	-	194	145	-	.75
TOTAL INSECTICIDES	110 <u>g/</u>	793	237	2.15	.30
					7.2

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" are not reported because two or more materials may have been used on the same acre, resulting in multiple counting. Therefore, quantity applied per treated acre and average times applied are not estimated.

c/ Acres treated (column 1) multiplied by average times applied (column 6).

d/ Includes chlordimeform, chlorpyrifos, EPN + methyl parathion, and monocrotophos.

e/ Includes endosulfan, EPN, parathion, and toxaphene.

f/ Quantity data not reported because Bacillus thuringiensis is expressed in terms of number of spores per gram rather than in pounds active ingredient.

g/ From Table 2, column 2.

APPENDIX B

1979 Insecticide Use on Cotton in the Delta region

- Table B-1. Coefficients of variation
- Table B-2. Arkansas
- Table B-3. Louisiana
- Table B-4. Mississippi
- Table B-5. Tennessee

Table B-1. Coefficients of variation for acres of cotton treated with single material and tank-mix applications of insecticides, by State, Delta region, 1979 a/

Insecticide	:	Arkansas	Louisiana	Mississippi	Tennessee	Delta
<u>Percent</u>						
<u>Single applications</u>						
Acephate	-	-	18	-	-	17
Aldicarb	29	-	20	57	-	16
Azinphosmethyl	-	44	22	-	-	18
Chlordimeform	18	29	14	-	-	10
Chlorpyrifos	-	-	41	-	-	33
Dicrotophos	31	-	11	32	-	9
Dimethoate	19	-	9	-	-	8
Disulfoton	57	-	50	30	-	24
EPN	-	b/	50	-	-	50
Fenvalerate	37	28	7	-	-	6
Methomyl	31	-	15	-	-	12
Methyl parathion	37	b/	16	-	-	15
Monocrotophos	-	-	22	-	-	22
Parathion	-	-	41	-	-	40
Permethrin	44	14	16	-	-	10
Sulprofos	-	49	22	-	-	19
<u>Tank mixes</u>						
Azinphosmethyl + permethrin	-	70	-	-	-	c/
Carbaryl + demeton + dicofol	-	-	-	-	b/	c/
Chlordimeform + EPN + methyl parathion	-	29	-	-	-	29
Chlordimeform + methomyl	16	-	-	-	-	16
EPN + methyl parathion	26	12	7	-	-	6
Fenvalerate + methyl parathion	-	-	31	-	-	c/
Methyl parathion + permethrin	-	-	28	-	-	28
Methyl parathion + toxaphene	31	-	37	-	-	24

- None reported.

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resources Economics Division.

b/ Use of this material at the State level was not significant and was reported in the "other" category.

Table B-2. Insecticide use on cotton in Arkansas, 1979 a/

Insecticide	: Acres : b/	: Acre- :treated :c/	: Quantity applied (a.i.) : treatments: : Total	: Average : times : Treated:Treatment : applied	
			1,000 -----1,000-----	1,000 -----Lbs.-----	No.
<u>Single applications</u>					
Aldicarb	35	35	9	.25	.25 1.0
Chlordimeform	89	242	45	.50	.18 2.7
Dicrotophos	25	29	4	.17	.15 1.1
Dimethoate	76	89	16	.21	.18 1.2
Disulfoton	10	10	2	.19	.19 1.0
Fenvalerate	22	146	16	.73	.11 6.6
Methomyl	35	35	15	.42	.42 1.0
Methyl parathion	22	54	18	.81	.33 2.4
Permethrin	16	32	3	.22	.11 2.0
Other d/	-	7	4	-	.60 -
Total	-	679	132	-	.19 -
<u>Tank mixes</u>					
Chlordimeform + methomyl	95	162	17	.18	.11 1.7
Methyl parathion + EPN	45	76	27	.60	.35 1.7
Methyl parathion + toxaphene	32	64	55	1.72	.86 2.0
Other e/	-	22	10	-	.45 -
Total	-	324	345	-	1.06 -
TOTAL INSECTICIDES	378 f/	1,003	477	1.26	.55 2.7

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" are not reported because two or more materials may have been used on the same acre, resulting in multiple counting. Therefore, quantity applied per treated acre and average times applied are not estimated.

c/ Acres treated (column 1) multiplied by average times applied (column 6).

d/ Includes monocrotophos and sulprofos.

e/ Includes Bacillus thuringiensis + malathion + toxaphene, dimethoate + chlordimeform, and methyl parathion + sulprofos.

f/ From Table 2, column 2.

Table B-3. Insecticide use on cotton in Louisiana, 1979 a/

Insecticide	: Acres : treated : b/	: Acre- treatments: : c/	: Quantity applied (a.i.) : Per acre : Total	: Average : times : Treated:Treatment : applied	
	-----1,000-----		1,000 lbs.	-----Lbs.-----	No.
<u>Single applications</u>					
Azinphosmethyl	22	40	5	.23	.13 1.8
Chlordimeform	48	316	69	1.42	.22 6.6
Fenvalerate	45	201	23	.50	.11 4.5
Methyl parathion	35	101	48	1.38	.48 2.9
Permethrin	141	951	105	.74	.11 6.7
Sulprofos	10	52	36	3.76	.70 5.4
Other d/	-	21	9	-	.43 -
Total	-	1,682	295	-	.18 -
<u>Tank mixes</u>					
Azinphosmethyl + permethrin	4	26	5	1.19	.20 6.0
			2	.52	.09
EPN + chlordimeform + methyl parathion	48	389	222	4.62	.57 8.1
			82	1.71	.21
			222	4.62	.57
Methyl parathion + EPN	243	1,304	861	3.54	.66 5.4
			861	3.54	.66
Methyl parathion + other e/	-	36	8	-	.22 -
			2	-	.05
Total	-	1,755	2,265	-	1.29 -
TOTAL INSECTICIDES	460 f/	3,437	2,560	5.57	.74 7.5

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" are not reported because two or more materials may have been used on the same acre, resulting in multiple counting. Therefore, quantity applied per treated acre and average times applied are not estimated.

c/ Acres treated (column 1) multiplied by average times applied (column 6).

d/ Includes acephate and aldicarb.

e/ Includes fenvalerate and methomyl.

f/ From Table 2, column 2.

Table B-4. Insecticide use on cotton in Mississippi, 1979 a/

Insecticide	: Acres : b/	: Acre- : treated : treatments : c/	: Quantity applied (a.i.) : Per acre : Total : Treated	: Average : times : Treatment	
		-----1,000-----	1,000 -----1,000----- lbs.	-----Lbs.-----	No.
<u>Single applications</u>					
Acephate	88	157	87	1.0	.56
Aldicarb	100	100	44	.43	.43
Azinphosmethyl	63	251	47	.74	.19
Chlordimeform	135	350	72	.54	.21
Chlorpyrifos	19	41	18	.99	.45
Dicrotophos	207	361	69	.33	.19
Dimethoate	285	438	48	.17	.11
Disulfoton	13	13	5	.41	.41
EPN	13	75	93	7.42	1.24
Fenvalerate	392	1,297	124	.32	.10
Methomyl	125	298	103	.82	.35
Methyl parathion	145	434	203	1.40	.47
Monocrotophos	60	69	30	.50	.43
Parathion	19	38	43	2.25	1.12
Permethrin	132	227	57	.43	.17
Sulprofos	16	47	28	1.80	.60
Other d/	-	10	3	-	.30
Total	-	4,316	1,074	-	.25
<u>Tank mixes</u>					
Methyl parathion + EPN	395	1,177	605	.51	1.53
			526	.45	1.33
Methyl parathion + chlordimeform + other e/	-	198	98	-	.49
			60	-	.30
			150	-	.76
Methyl parathion + fenvalerate	28	82	32	1.12	.39
			7	.25	.09
Methyl parathion + permethrin	38	129	32	.89	.25
			14	.38	.10

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Table B-4. Insecticide use on cotton in Mississippi, 1979 a/
-- continued

Insecticide	: Acres : treated : b/	Acre- treatments: c/	: Quantity applied (a.i.) : Per acre : Total	: Average : times : Treated:Treatment	: applied
	-----1,000-----		1,000 lbs.	-----Lbs.-----	No.
<u>Tank mixes (cont'd)</u>					
Methyl parathion + toxaphene	22	40	28 56	1.28 2.56	.69 1.39
Methyl parathion + other <u>f/</u>	-	104	32 57	-	.31 .55
Other <u>g/</u>	-	41	20	-	.49
Total	-	1,771	1,717	-	.97
TOTAL INSECTICIDES	1,026 <u>h/</u>	6,087	2,791	2.72	.46
					5.9

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" are not reported because two or more materials may have been used on the same acre, resulting in multiple counting. Therefore, quantity applied per treated acre and average times applied are not estimated.

c/ Acres treated (column 1) multiplied by average times applied (column 6).

d/ Includes trichlorfon and Bacillus thuringiensis.

e/ Includes EPN, methomyl, and toxaphene.

f/ Includes endosulfan, EPN + chlorpyrifos, EPN + methomyl, EPN + permethrin, methomyl, parathion, and permethrin + toxaphene.

g/ Includes Bacillus thuringiensis + chlordimeform + methomyl and malathion + toxaphene.

h/ From Table 2, column 2.

Table B-5. Insecticide use on cotton in Tennessee, 1979 a/

Insecticide	: Acres : b/	: Acre- : treated : treatments : c/	: Quantity applied (a.i.) : Per acre : Total	: Average : times : Treated:Treatment : applied	
		1,000	1,000 -----1,000----- 1,000	Lbs. -----Lbs.----- Lbs.	No.
<u>Single applications</u>					
Aldicarb	13.2	13.2	12.4	.94	.94 1.0
Dicrotophos	23.6	23.6	2.2	.09	.09 1.0
Disulfoton	26.3	26.3	3.9	.15	.15 1.0
Total	-	63.1	18.5	-	.29 -
<u>Tank mixes</u>					
Carbaryl + dicofol + demeton	2.6	2.6	1.2 .5 1.2	.45 .18 .45	.45 1.0 .18 .45
Total	2.6	2.6	2.9	1.08	1.08 1.0
TOTAL INSECTICIDES	66.0 <u>d/</u>	65.7	21.4	.33	.33 1.0

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" are not reported because two or more materials may have been used on the same acre, resulting in multiple counting. Therefore, quantity applied per treated acre and average times applied are not estimated.

c/ Acres treated (column 1) multiplied by average times applied (column 6).

d/ From Table 2, column 2.

APPENDIX C

1979 Insecticide Use on Cotton in the Southern Plains region

Table C-1. Coefficients of variation

Table C-2. Oklahoma

Table C-3. Texas

Table C-1. Coefficients of variation for acres of cotton treated with single material and tank-mix applications of insecticides, by State, Southern Plains region, 1979 a/

Insecticide	:	Oklahoma	:	Texas	:	Southern Plains
<u>Percent</u>						
<u>Single applications</u>						
Acephate	-		31		27	
Aldicarb	-		30		30	
Azinphosmethyl	-		17		16	
<u>Bacillus thuringiensis</u>	-		31		31	
Chlordimeform	57		27		25	
Dicrotophos	36		9		9	
Dimethoate	-		18		14	
Disulfoton	b/		27		26	
Fenvalerate	-		31		29	
Parathion	-		31		31	
Permethrin	44		19		18	
Sulprofos	-		38		38	
Trichlorfon	57		30		26	
<u>Tank mixes</u>						
Chlordimeform						
+ EPN	-					
+ methyl parathion	-		21		21	
Chlordimeform						
+ fenvalerate	70		b/		45	
Chlordimeform						
+ parathion	-					
+ permethrin	70		-		70	
Chlordimeform						
+ permethrin	36		50		32	
EPN						
+ fenvalerate	-					
+ methyl parathion	-		44		44	
EPN						
+ methyl parathion	-		23		23	
Methyl parathion						
+ toxaphene	-		31		31	

- None reported.

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resources Economics Division.

b/ Use of this material at the State level was not significant and was reported in the "other" category.

Table C-2. Insecticide use on cotton in Oklahoma, 1979 a/

Insecticide	: Acres : treated : b/	: Acre- treatments: : c/	: Quantity applied (a.i.) : Per acre : Total	: Average : times : Treated:Treatment : applied	
			1,000 -----1,000----- lbs.	1,000 -----Lbs.-----	No.
<u>Single applications</u>					
Chlordimeform	21	21	4	.18	.18 1.0
Dicrotophos	49	56	6	.13	.12 1.1
Permethrin	35	148	13	.38	.09 4.2
Trichlorfon	21	35	18	.83	.50 1.7
Other d/	-	8	10	-	1.16 -
Total	-	268	51	-	.19 -
<u>Tank mixes</u>					
Chlordimeform + fenvalerate	14	42	5	.33	.11 3.0
			5	.27	.09
Chlordimeform + parathion + permethrin	14	14	3	.21	.21 1.0
			4	.25	.25
			1	.05	.05
Chlordimeform + permethrin	49	155	16	.32	.10 3.1
			11	.23	.07
Total	-	211	44	-	.20 -
TOTAL INSECTICIDES	113 e/	479	95	.83	.19 4.2

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" are not reported because two or more materials may have been used on the same acre, resulting in multiple counting. Therefore, quantity applied per treated acre and average times applied are not estimated.

c/ Acres treated (column 1) multiplied by average times applied (column 6).

d/ Includes carbaryl and disulfoton.

e/ From Table 2, column 2.

Table C-3. Insecticide use on cotton in Texas, 1979 a/

Insecticide	: Acres : b/	: Acre- : treated : c/	: Quantity applied (a.i.) : Per acre : Total	: Average : times : Treated:Treatment	: Average : applied
			1,000 -----1,000----- 1,000	1,000 -----Lbs.----- Lbs.	No.
<u>Single applications</u>					
Acephate	78	122	77	.98	.63
Aldicarb	210	210	107	.51	.51
Azinphosmethyl	225	356	115	.51	.32
<u>Bacillus</u>					
<u>thuringiensis d/</u>	84	175	-	-	2.1
Chlordimeform	203	331	68	.34	.21
Dicrotophos	766	1,593	159	.21	.10
Dimethoate	308	577	132	.43	.23
Disulfoton	113	113	113	1.00	1.00
Fenvalerate	74	655	72	.98	.11
Parathion	122	137	107	.87	.78
Permethrin	348	598	53	.15	.09
Sulprofos	113	113	120	1.06	1.06
Trichlorfon	77	107	28	.36	.26
Other e/	-	38	15	-	.36
Total	-	5,125	1,166	-	.23
<u>Tank mixes</u>					
Azinphosmethyl + other f/	-	155	39	-	.25
			21	-	.14
<u>Bacillus thuringiensis</u> + other g/	-	91	-	-	-
			29	-	.32
Chlordimeform + permethrin	65	452	49	.76	.11
			46	.70	.10
Chlordimeform + other h/	-	362	43	-	.12
			238	-	.66
Methyl parathion + EPN	132	456	346	2.62	.76
			346	2.62	.76
Methyl parathion + EPN + chlordimeform	165	655	419		4.0
			419		
			60		
Methyl parathion + EPN + fenvalerate	37	110	55	1.5	.50
			28	.75	.25
			10	.27	.09

-- continued

Table C-3. Insecticide use on cotton in Texas, 1979 a/
-- continued

Insecticide	: Acres : b/	: Acre- : treated : treatments : c/	: Quantity applied (a.i.) : Per acre : Total	: Average : times : Treated:Treatment : applied	
			1,000 -----1,000----- lbs.	1,000 -----Lbs.----- No.	
<u>Tank mixes (cont'd)</u>					
Methyl parathion + toxaphene	74	191	154 254	2.09 3.46	.80 1.33
Methyl parathion + other i/	-	209	76 173	-	.36 .83
Toxaphene + other j/	-	73	43 40	-	-
Total	-	2,754	2,888	-	1.05
TOTAL INSECTICIDES	1,979 k/	7,879	4,054	2.05	.51
					4.0

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" are not reported because two or more materials may have been used on the same acre, resulting in multiple counting. Therefore, quantity applied per treated acre and average times applied are not estimated.

c/ Acres treated (column 1) multiplied by average times applied (column 6).

d/ Quantity data not reported because Bacillus thuringiensis is expressed in terms of number of spores per gram rather than in pounds active ingredient.

e/ Includes demeton, methyl parathion, and methomyl.

f/ Includes chlordimeform, dicrotophos, fenvalerate, and permethrin.

g/ Includes dicrotophos, sulprofos, and trichlorfon.

h/ Includes dicrotophos, endosulfan, EPN, fenvalerate, methomyl, methyl parathion, monocrotophos, parathion, permethrin, and toxaphene.

i/ Includes carbaryl, dimethoate, endosulfan, EPN, fenvalerate, methomyl, and monocrotophos.

j/ Includes monocrotophos and parathion.

k/ From Table 2, column 2.

APPENDIX D

1979 Insecticide Use on Cotton in the Far West region

Table D-1. Coefficients of variation

Table D-2. Arizona

Table D-3. California

Table D-4. New Mexico

Table D-1. Coefficients of variation for acres of cotton treated with single material and tank-mix applications of insecticides, by State, Far West region, 1979 a/

Insecticide	: Arizona	: California	: New Mexico	: Far West
	<u>Percent</u>			
<u>Single applications</u>				
Acephate	26	21	-	16
Aldicarb	57	15	31	14
Azinphosmethyl	57	46	-	39
Carbophenothion	70	-	-	c/
Chlordimeform	22	-	-	22
Chlorpyrifos	-	61	-	c/
Diazinon	-	-	70	c/
Dicofol	-	9	-	9
Dimethoate	49	53	b/	36
Disulfoton	-	29	33	28
Fenvalerate	25	20	-	17
Malathion	-	-	44	c/
Methamidophos	-	23	-	23
Methidathion	40	15	-	26
Methomyl	49	36	-	29
Methyl parathion	50	-	-	39
Monocrotophos	30	24	-	18
Naled	-	57	-	c/
Permethrin	18	22	-	14
Phorate	-	33	-	22
Propargite	-	12	-	12
Sulfur	70	27	-	23
<u>Tank mixes</u>				
Acephate + chlorpyrifos	-	57	-	57
Chlordimeform + fenvalerate	57	-	-	57
Chlordimeform + methyl parathion	40	-	-	40
Chlordimeform + methyl parathion + parathion	57	-	-	57
Chlordimeform + monocrotophos	47	-	-	47
Chlordimeform + permethrin	15	-	-	15

-- continued

Table D-1. Coefficients of variation for acres of cotton treated with single material and tank-mix applications of insecticides, by State, Far West region, 1979 a/ -- continued

Insecticide	:	:	:	:
	: Arizona	: California	: New Mexico	: Far West
<u>Percent</u>				
<u>Tank mixes (cont'd)</u>				
Dicofol				
+ toxaphene	-	37	-	37
Methamidophos				
+ propargite	-	37	-	37
Methidathion				
+ fenvalerate	-	46	-	46
Methyl parathion				
+ parathion	40	-	-	40
Parathion				
+ sulfur	-	37	-	37

- None reported.

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resources Economics Division.

b/ Use of this material at the State level was not significant and was reported in the "other" category.

c/ Use of this material at the regional level was not significant and was reported in the "other" category.

Table D-2. Insecticide use on cotton in Arizona, 1979 a/

Insecticide	: Acres : treated : b/	: Acre- treatments: c/	: Quantity applied (a.i.) Per acre Total	: Average times Treated:Treatment	: applied
	-----1,000-----		1,000 lbs.	-----Lbs.-----	No.
<u>Single applications</u>					
Acephate	88	155	86	.98	.55
Aldicarb	21	21	23	1.10	1.10
Azinphosmethyl	49	187	53	1.10	.29
Carbophenothion	13	40	25	1.91	.62
Chlordimeform	117	428	94	.80	.22
Dimethoate	28	35	9	.32	.26
Fenvalerate	97	213	23	.23	.11
Methidathion	42	42	19	.46	.46
Methomyl	28	28	12	.42	.42
Methyl parathion	25	50	41	1.66	.83
Monocrotophos	69	90	55	.79	.61
Permethrin	159	305	46	.29	.15
Sulfur	14	21	239	17.25	11.50
Other d/	-	74	69	-	.93
Total .	-	1,689	794	-	.47
<u>Tank mixes</u>					
Chlordimeform + fenvalerate	21	69	12	.56	.17
			9	.44	.13
Chlordimeform + methyl parathion	42	55	13	.31	.23
			40	.96	.72
Chlordimeform + methyl parathion + parathion	21	62	9	.44	.13
			18	.84	.28
			35	1.68	.56
Chlordimeform + monocrotophos	29	85	21	.71	.25
			80	2.71	.94
Chlordimeform + permethrin	196	623	100	.51	.16
			81	.41	.13
Chlordimeform + other e/	-	183	33	-	.18
			178	-	.97

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Table D-2. Insecticide use on cotton in Arizona, 1979 a/
-- continued

Insecticide	: Acres : treated : b/	: Acre- : treatments: : c/	: Quantity applied (a.i.) : Per acre : Total	: Average : times : Treated:Treatment	
			1,000 -----1,000-----	1,000 lbs.	-----Lbs.----- No.
<u>Tank mixes (cont'd)</u>					
Methyl parathion + parathion	42	104	48 95	1.14 2.29	.46 .91
Methyl parathion + other f/	-	35	14 13	-	.40 .37
Insecticides + other g/	-	40	36	-	.90
Total	.	1,256	835	-	.66
TOTAL INSECTICIDES	529 h/	2,945	1,629	3.08	.55
					5.6

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" are not reported because two or more materials may have been used on the same acre, resulting in multiple counting. Therefore, quantity applied per treated acre and average times applied are not estimated.

c/ Acres treated (column 1) multiplied by average times applied (column 6).

d/ Includes carbophenothion, endosulfan, EPN, trichlorfon, disulfoton, methamidophos, phorate, and sulprofos.

e/ Includes acephate, carbaryl, chlorpyrifos, dimethoate, EPN, methidathion, methamidophos, methyl parathion, monocrotophos, parathion, permethrin, sulprofos, and trichlorfon.

f/ Includes acephate, endosulfan, and EPN.

g/ Includes azinphosmethyl + malathion, monocrotophos + permethrin, chlordimeform + fenvalerate, and trichlorfon + sulfur.

h/ From Table 2, column 2.

Table D-3. Insecticide use on cotton in California, 1979 a/

Insecticide	: Acres : b/	: Acre- treated : c/	: Quantity applied (a.i.) : treatments: : Total	: Average : times : Treated:Treatment : applied
			1,000 -----1,000----- lbs.	1,000 -----Lbs.----- No.
<u>Single applications</u>				
Acephate	135	188	105	.78 .56 1.4
Aldicarb	275	297	200	.73 .67 1.1
Azinphosmethyl	13	23	7	.54 .31 1.8
Chlorpyrifos	18	31	15	.85 .49 1.7
Dicofol	559	566	438	.78 .77 1.0
Dimethoate	24	24	5	.21 .2 1.0
Disulfoton	82	82	74	.90 .90 1.0
Fenvvalerate	54	202	28	.52 .14 3.7
Methamidophos	127	135	94	.73 .69 1.1
Methidathion	50	122	56	1.13 .46 2.4
Methomyl	51	58	22	.42 .38 1.1
Monocrotophos	89	188	126	1.42 .67 2.1
Naled	22	30	24	1.08 .81 1.4
Permethrin	72	124	13	.21 .12 1.7
Phorate	165	165	95	.65 .65 1.0
Propargite	383	402	576	1.51 1.44 1.0
Sulfur	71	153	2,598	36.45 16.94 2.2
Other d/	-	21	32	- 1.52 -
Total	-	2,811	4,510	- 1.60 -
<u>Tank mixes</u>				
Acephate + chlorpyrifos	22	22	17 8	.75 .75 .37 .37
Dicofol + toxaphene	52	52	39 12	.74 .74 .22 .22
Fenvvalerate + methidathion	13	158	19 75	1.44 .12 12.2 5.70 .47
Parathion + sulfur	52	98	70 1,500	1.35 .71 1.9 28.85 15.31
Propargite + methamidophos	52	60	71 30	1.36 1.19 1.2 .58 .50

-- continued

Table D-3. Insecticide use on cotton in California, 1979 a/
-- continued

Insecticide	: Acres : b/	: Acre- : treated : treatments : c/	: Quantity applied (a.i.) : Per acre : Total : Treated	: Average : times : Treatment	: applied	
		-----1,000-----	1,000 lbs.	-----Lbs.-----		No.
<u>Tank mixes (cont'd)</u>						
Propargite + other e/	-	23	8 25	-	.35 .82	-
Insecticides + other f/	-	63	851	-	13.54	-
Total	-	476	2,725	-	5.63	-
TOTAL INSECTICIDES	1,391 g/	3,287	7,235	5.20	2.20	2.4

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" are not reported because two or more materials may have been used on the same acre, resulting in multiple counting. Therefore, quantity applied per treated acre and average times applied are not estimated.

c/ Acres treated (column 1) multiplied by average times applied (column 6).

d/ Includes diazinon and methyl parathion.

e/ Includes acephate, dimethoate, and methidathion.

f/ Includes monocrotophos + methomyl, monocrotophos + permethrin, dicofol + dimethoate, dicofol + naled, and trichlorfon + sulfur.

g/ From Table 2, column 2.

Table D-4. Insecticide use on cotton in New Mexico, 1979 a/

Insecticide	: Acres : treated : b/	: Acre- : treatments : c/	: Quantity applied (a.i.) : Per acre : Total	: Average : times : Treated:Treatment	
			1,000 -----1,000----- 1,000 lbs.	Lbs.	No.
<u>Single applications</u>					
Aldicarb	25	25	9	.37	.37
Diazinon	5	11	11	2.00	1.00
Disulfoton	24	24	17	.70	.70
Malathion	12	23	36	2.93	1.56
Other	3	3	1	.25	.25
Total	-	86	74	-	.86
TOTAL INSECTICIDES	69 <u>d/</u>	86	74	1.06	.86
					1.2

a/ "1979 Cotton Pesticide Use Survey," USDA, ESCS, Natural Resource Economics Division.

b/ Data in this column for "other" and "total" are not reported because two or more materials may have been used on the same acre, resulting in multiple counting. Therefore, quantity applied per treated acre and average times applied are not estimated.

c/ Acres treated (column 1) multiplied by average times applied (column 6).

d/ From Table 2, column 2.



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